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IMPROVED PROTECTIVE COATING FOR SONAR DOMES.(U)
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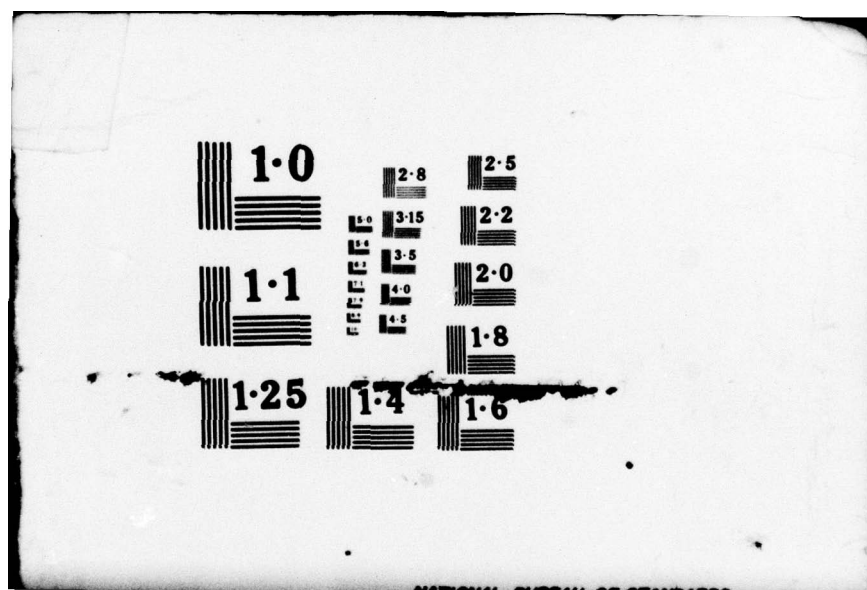
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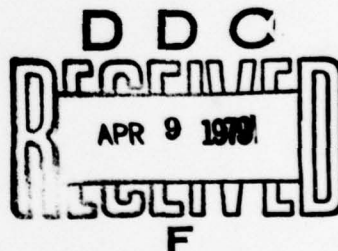
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Lab. Project 9300-43
Technical Memorandum 7
SS-041, W.U. 8213

IMPROVED PROTECTIVE COATING
FOR
SONAR DOMES

Material Sciences Division

15 November 1966



U. S. NAVAL APPLIED SCIENCE LABORATORY
BROOKLYN, NEW YORK

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Lab. Project 9300-43
Technical Memorandum #7

- Ref: (a) NAVAPLSCIENLAB Program Summary, Task No. 8481/2, Improved Protective Coatings for Sonar Domes, of 1 May 1966
(b) Lab. Project 9300-43, Technical Memorandum #4, Improved Protective Coatings for Sonar Domes of 18 Mar 1966
(c) Visit of Mr. A. W. Cizek (NASL Code 937) with Mr. J. Rigdon (Code 1631) and Mr. E. Morgenstern (Code 6634A of NAVSHIPSYSTEMS COMMAND, on 24 Aug 1966
(d) Bureau of Ships Technical Manual, Chapter 9190 - Perservation of Ships in Service, Revision 6/1/63
(e) Visit of Mr. A. W. Cizek (NASL Code 937) with Mr. L. Rossi (Value Engineering, Code 249, Boston Naval Shipyard) on 27 Oct 1966

INTRODUCTION

1. The development of anti-corrosion, anti-fouling sonar dome coating systems which have good erosion resistance, and are capable of adhering when exposed to high level pulse fields generated by currently used high power sonar transducers, is continuing at the U. S. Naval Applied Science Laboratory, in accordance with reference (a).
2. This technical memorandum concerns the sonar dome anti-corrosion coating system designated NASL No.22F, which has been found to have high resistance to the cavitation attack which occurs in a sonic pulse field. Information provided herein supplements data submitted under reference (b) and deals specifically with a description of the coating system and detailed instructions for its application.

BACKGROUND

3. The favorable results for NASL coating No. 22F reported in reference (b), after simulated service tests at the USNUSL test site and after laboratory tests at NASL, using the new high sonic pulse facility, indicate that consideration should be given for a shipboard trial of the No.22F coating system, as an erosion resistant, anti-corrosion system. It is recognized that the NASL 22F coating will, at this time, provide only corrosion protection and will be an interim solution pending development of a suitable anti-fouling component. It is anticipated that at not-too-frequent intervals the coated dome will be scrubbed clean by a scuba diver, employing the current practice, and taking precautions to avoid damage to the coating.
4. During a discussion of sonar dome problems on the occasion of reference (e), it was indicated that since no coating is currently applied to the window area of the SQS-26 sonar domes, the resulting corrosion of the dome affects the performance of the sonar to such an extent that too-frequent docking is

required for removal of the corrosion deposits and refinishing of the dome surface. It was further indicated that since approximately 150 man-days are required to refinish a dome, a considerable saving could be realized, and the vessel could remain on station, if an anti-corrosive coating system with the necessary properties could be applied.

Description of NASL No. 22F Coating System

5. The NASL 22F coating system consists of the following components:

TABLE I

Coating Schedule	Table I Component	Drying Time	Dry Coating Thickness-Mils
1st Coat	NAVY F 117 - Wash Primer	1 Hr. Min.	0.3-0.5
2nd Coat	NAVY F 120 - Zinc Chromate Primer	1 Hr. Min.	1.5
3rd Coat	Dupont Black Sealant RP 5005	12-18 Hrs.	4.0-5.0) Total
4th Coat	Dupont Black Sealant RP 5005	12-18 Hrs.) 13.0
5th Coat	Dupont Black Sealant RP 5005	12-18 Hrs.	4.0-5.0) Mils
) Mini..
			4.0-5.0) mm

APPLICATION PROCEDURE

6. Details for preparation and application of the three components are as follows:

(a) SPRAY APPLICATION OF NAVY F117 AND NAVY F120 -

After sandblasting of the sonar dome, a spray coat of F117 wash primer followed by a spray coat of F120 zinc chromate primer is applied using conventional spray procedures, in accordance with paragraph 9190.66 of reference (d) "Application of Vinyl Paints". A 2 pass spray technique per coat, for each of the paints is used, with each spray coat crisscrossing at 90° the previous pass.

(b) INSTRUCTIONS FOR MIXING AND SPRAYING OF DUPONT BLACK SEALANT RP5005 -

1. MIXING - The required components, including thinners and activator to make material sprayable are:

1 gal. DuPont Black Sealant RP 5005
2 fl. ozs. DuPont Activator VH5821
65 fl. ozs. Methyl Isobutyl Ketone
19- $\frac{1}{2}$ fl. ozs. Xylene

Agitate the viscous DuPont Black Sealant with a mechanical mixer until it becomes fluid. Slowly add the Methyl Isobutyle Ketone and then the Xylene while slowly stirring the mixture. After all thinners have been incorporated, add the measured amount of VH5821 activator, and mix thoroughly to fully incorporate activator. Loosely cover the mixing container, and allow the mixture to stand 20 minutes in order to disperse any entrapped air and to permit release of evolved carbon dioxide. Mix again, and filter the mixture through a fine mesh screen before pouring into the pressure spray feed tank.

2. SPRAYING - The required spray equipment and adjustments are:

a. SPRAY EQUIPMENT

DeVilbiss Co. pressure feed tank
DeVilbiss Co. Spray gun type MBC
DeVilbiss Co. Air Cap - #76
DeVilbiss Co. fluid tip - AV-15-E
DeVilbiss Co. fluid needle - MBC-444-E

b. SPRAY EQUIPMENT Adjustments

Atomization pressure - 50 lbs.
Width of Spray-Spreader Adjusting Valve Setting #16
Fluid Adjustment - Two complete turns opening of
fluid needle
Feed Tank Pressure - 5 lbs. (Increase pressure
gradually if necessary.
Just enough to deliver
material).

Spray the mixed DuPont RP5005 component, after adjusting the spray equipment as indicated above. Spray at a normal rate, at a distance of approx. 12 to 14 inches from the work surface. Spray 3 coats of material to a total dry film thickness of 13 mils minimum, with a thickness of 4 to 5 mils maximum per coat. Allow coating to air dry 12-18 hours between coats. A two pass spray technique is required, and may be regarded as one coat. A minimum of two minutes elapsed time between passes is recommended. Each spray pass should criss-cross at 90° the previous pass. After each of the coats is dried, a film thickness measurement should be made. It is recommended that a close

control on thickness per coat be maintained, in order to achieve a total dry film thickness of 13 mils minimum in 3 spray coats. Close control will assure "pimple-free" surface finish. Inasmuch as the RP5005 component is a modified, moisture-cured polyurethane material, the mixing thinners used should be moisture free, of a "urethane" grade. Also an air filter should be connected to the air supply line used for spraying, to prevent mixing of moisture with the sprayed paint, as mentioned in paragraph 9190.62 (TECHNIQUES) of reference (d). It should be noted that the DuPont Black Sealant RP5005 has a pot life of 4 hours. Accordingly, mixing with thinners and activator, should be done immediately prior to use. The mixed material may be used as long as it does not thicken appreciably.

DISCUSSION

7. It was apparent from discussions on the occasion of references (c) and (e) that an interim solution, involving corrosion protection of the sonar dome would greatly relieve an intolerable sonar dome maintenance problem. It is also apparent that the NASL No. 22F coating system can be selected for this interim solution based on the following considerations.

(a) It has demonstrated exceptional resistance to cavitation attack in high level sonic fields

(b) It can be applied in a relatively short interval of 3 days.

(c) It can be applied in relatively few coats (5) and in this respect minimizes solvent retention between coats.

(d) No problem has been experienced in solvent retention of the 5 coat NASL 22F coating system due to atmospheric conditions, to effect the adhesion between the various coats. Accordingly, no special precautions other than those outlined in paragraph 6 above, are required for application of NASL 22F coating system.

RECOMMENDATIONS

8. Concerning the NASL No. 22F coating system described in paragraph 5, above, the following recommendations are made:

(a) That it be applied to a shipboard SQS-26 sonar dome for service trials.

(b) That it be applied as described in paragraph 6, above.

(c) That this Laboratory be informed when such an application is to be made so that assistance and technical guidance may be provided in the preliminary planning, surface preparation and coating application.